PATENT SPECIFICATION

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PROVISIONAL SPECIFICATION

Improvements relating to Sealing Discs for Electrical Condensers

We, RONALD TRIST & Co., LIMITED, a British Company, of Bath Road, Slough, in the County of Buckingham, and DUDLEY STUART PRINCE, a British Subject, of the Company's address, do hereby declare the nature of this invention to be as follows:—

Tubular electrical condensers, such as are used in radio work, are commonly provided with sealing discs which must make air-tight seals with the condenser casing and must also have good insulating properties and adequate strength to take any end load applied when the condenser is connected in circuit. It is usual to make such a disc from a phenol-formaldehyde resin to which is bonded a layer of rubber. The rubber provides a relatively soft surface which will easily make air-tight contact with the casing, e.g. by spinning over the end of the tubular casing into close contact with the rubber, and the resin provides the necessary strength and a large part of the insulation. Now natural rubber is not as resistant to oil or heat as is desirable and in addition it is in short supply at present. Synthetic rubber is available and has better properties than natural rubber for the purposes in view, but it will not bond sufficiently tightly to a resin or other insulating disc to ensure the necessary air-tightness. A number of different attempts have been made recently to solve this bonding problem but none has been successful.

According to the present invention holes are formed in or slots are made in the edge of a resin or other insulating disc and synthetic rubber integral with that from which the outer or covering layer is formed is caused to flow through these holes or slots and to key the layer of synthetic rubber on the outside firmly to the disc. It is found that a completely air-tight and firm bond can be produced in this way and thus the advantages of synthetic rubber can be obtained without the loss of air-tightness.

In producing such a composite end disc the holes or slots may be formed in the resin or other insulating disc in any convenient way, e.g. by punching, and the disc may then be placed in the female part of a mould formed with an internal shoulder, the edge of the disc resting on this shoulder. A synthetic rubber in an amount enough to form both the outer covering and the keying material is then placed in the mould and subjected to the action of a plunger. As a rule end discs of the kind in question have a central hole for the reception of a terminal of the condenser and the plunger may be provided with a stem which enters and completely fills this hole. As the plunger moves into the moulds some of the synthetic rubber is forced through the holes or slots into the space below the insulating disc and within the shoulder. It is easiest so to carry on the process that the rubber that flows through the holes or slots joins up on the reverse or inner face of the insulating disc, but it is not necessary that it should do this provided that at each hole or slot there is rubber integral with the outer layer and extending over part of the reverse or inner face.

The syntheaic rubber which it is preferred to use and with which the bonding difficulty principally arises is a butadiene-base rubber such as that known as "perbunan", or the synthetic rubber sold under the name "neoprene".

The rigid part of the composite disc is preferably made from a phenol-formaldehyde resin of the kind that sets rigid under heat. Since the synthetic rubber is naturally moulded as described above in the unvulcanised state and is usually subsequently vulcanised, although if desired it may be of a self-vulcanising composition, it is sometimes convenient to key the rubber to the resin disc while the latter is still in the uncured or semi-rigid state and to cure both materials together with a single operation. If the uncured resin disc tends to deform during the moulding of the rubber a layer of rubber may be placed beneath the disc and within the shoulder in the mould so that the rubber subsequently forced through the holes or slots joins up integrally with this layer. Of course such a layer may also be placed in the mould before the rigid resin or like

[*Price* 1/-]

disc is introduced into the mould, but this merely complicates the manufacturing process since if the disc is rigid all the rubber required on the reverse or inner face of it can easily be forced through the holes or slots.

Dated this 27th day of November, 1943.

For the Applicants:—
GILL, JENNINGS & EVERY,
Chartered Patent Agents,
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COMPLETE SPECIFICATION

Improvements relating to Sealing Discs for Electrical Condensers

We, RONALD TRIST & Co., LIMITED, a British Company, of Bath Road, Slough, in the County of Buckingham, and DUDLEY STUART PRINCE, a British Subject of the Company's address, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

Tubular electrical condensers, such as are used in radio work, are commonly provided with sealing discs which must make air-tight seals with the condenser casing and must also have good insulating properties and adequate strength to take any end load applied when the condenser is connected in circuit. It is usual to make such a disc from a phenol-formaldehyde resin to which is bonded an outer layer of rubber. The rubber provides a relatively soft surface which will easily make air-tight contact with the casing, e.g. by spinning over the end of the tubular casing into close contact with the rubber, and the resin provides the necessary strength and a large part of the insulation. These composite discs are usually made by cementing a sheet of rubber to a sheet of resin and then stamping the discs out of the composite sheets.

Neither the discs described nor the methods of manufacture are completely satisfactory. Fracture is liable to occur in the stamping process, and in any case it is not easy to cut a composite material. Natural rubber is not as resistant to oil or heat as is desirable and in addition it is in short supply at present. Synthetic rubber is available and has better properties than natural rubber for the purposes in view, but it will not bond sufficiently tightly to a resin or other insulating disc to ensure the necessary air-tightness. A number of different attempts have been made recently to solve this bonding problem but none has been successful. Our aim is to unite synthetic rubber satisfactorily to a rigid insulating disc.

According to the invention synthetic rubber integral with that from which the outer layer is formed is caused to flow through holes or slots made in the insulating disc and to extend over part at least of the inner face so as to key the outer layer to the rigid disc. It is found that a completely air-tight and firm bond can be produced in this way and thus the advantages of synthetic rubber can be obtained without the loss of air-tightness.

The rigid part of the composite disc is preferably made from a phenol-formaldehyde resin of the kind that sets rigid under heat. The synthetic rubber which it is preferred to use and with which the bonding difficulty principally arises is a butadiene-base rubber such as that sold under the Registered Trade Mark "Perbunan", or the synthetic rubber sold under the name "neoprene".

The production of one composite disc will now be described by way of example with reference to the accompanying drawings, in which:

Figure 1 shows the first stage, a rigid insulating disc having been inserted in a cavity mould;

Figure 2 is a plan of the insulating disc; and

Figure 3 shows a later stage in which the composite disc has been formed in the mould.

First holes are formed in a resin insulating disc 1 in any convenient way, e.g. by punching, there being a single central hole 2 and three smaller holes 3 spaced evenly around the central hole. The disc 1 is then placed in a cavity mould 4, the cavity in the mould having an internal shoulder 5 on which the disc 1 rests. Synthetic rubber in an amount enough to form both the outer layer and the keying material is placed on the disc and a plunger 6 is introduced into the mould. This plunger has a central spigot 7 which exactly fits the hole 2 in the disc 1 so that the final composite disc will have a hole for the reception of a terminal of the condenser. The cavity mould 4 is formed with a central opening 8 to receive this spigot 7. The plunger itself is cylindrical and projects from a body 9 which is shaped to fit over the body of the cavity mould 4 in the way usual in counterpart

moulding, the cylindrical plunger 6 fitting closely inside the cavity in the part 4. As the plunger moves into the cavity part some of the synthetic rubber is forced through the holes into the space below the disc 1 and within the shoulder 5. Within this space it flows laterally, the rubber passing through the three individual holes joining up to form a continuous circular layer on the reverse or inner face of the disc 1. It is not absolutely necessary that the rubber should join up in this way, but at each hole there must be rubber integral with the outer layer which is formed and which is shown at 10 in Figure 3, and this integral rubber must extend over at least part of the reverse or inner face.

In the example described above, the rigid disc is formed with holes spaced inwards from its edge far enough to be clear of the shoulder 5. Instead of holes of this kind, slots may be made in the edge of the disc and extend radially inwards far enough to present openings lying within the circle defined by the inner edge of the shoulder 5.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A method of making a composite sealing disc for an electrical condenser by uniting an outer synthetic rubber layer to a rigid insulating disc in which synthetic rubber integral with that from which the outer layer is formed is caused to flow through holes or slots made in the insulating disc and to extend over part at least of the inner face so as to key the outer layer to the rigid disc.

2. A method according to claim 1 in which the rigid disc is placed in a cavity mould formed with an internal shoulder with its edge resting on this shoulder, synthetic rubber in an amount enough to form both the outer layer and the keying material is placed on the disc and a plunger is introduced into the mould to force the rubber through the holes or slots in the disc to form a keying layer filling the space below the disc and within the shoulder.

3. A method according to claim 1 or claim 2 in which the rigid disc is made from a phenol-formaldehyde resin of the kind that sets rigid under heat and the synthetic rubber either has a butadiene base or is of the kind sold under the name "neoprene".

4. A composite sealing disc for an electrical condenser made by a method according to any of claims 1 to 3.

Dated this 27th day of November, 1944.

For the Applicants:—
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FIG. 1.

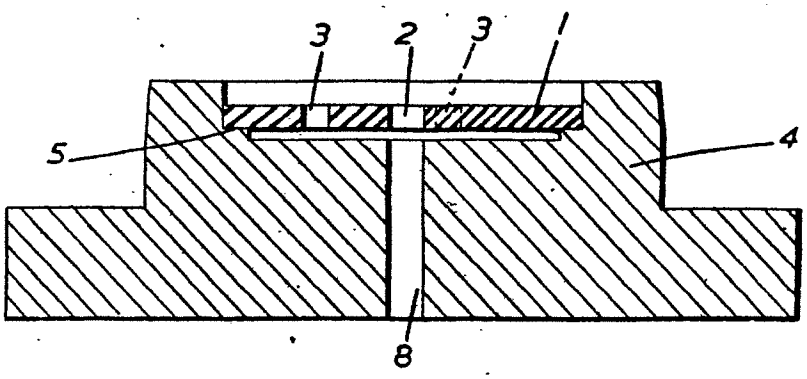


FIG. 2.

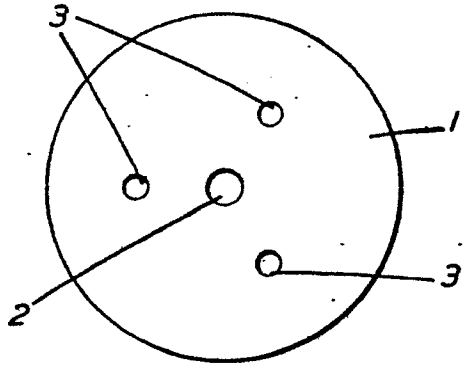
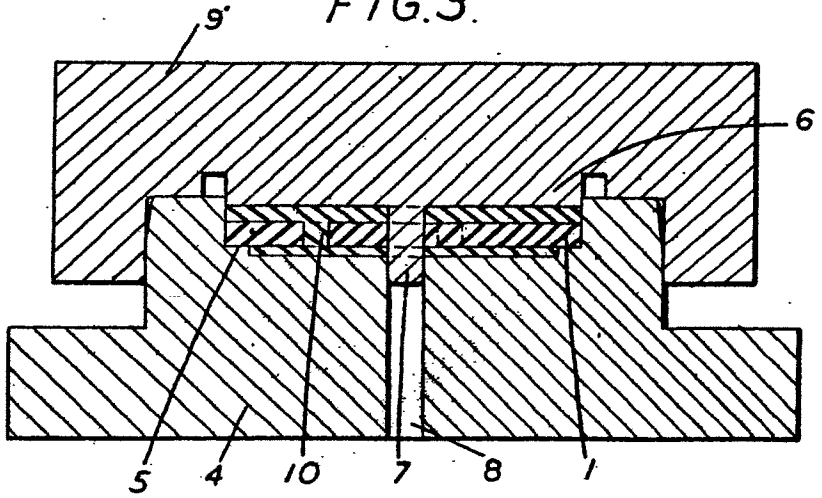


FIG. 3.



[This Drawing is a full-size reproduction of the Original.]

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